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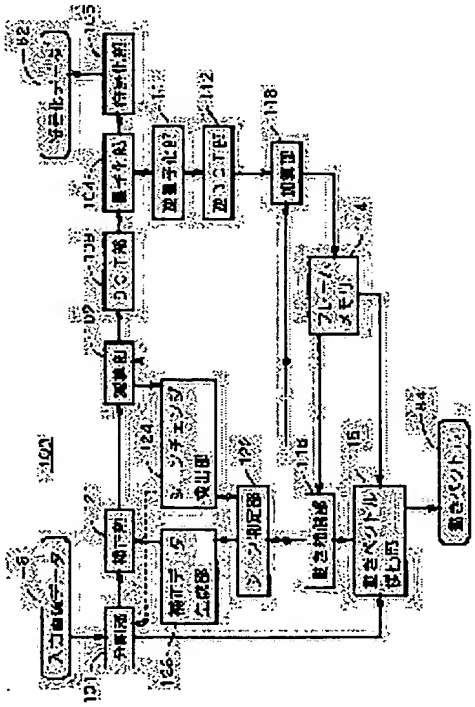
(54) MOVING IMAGE PROCESSOR AND MOVING IMAGE PROCESSING METHOD AND RECORDING MEDIUM

(57)Abstract:

PROBLEM TO BE SOLVED: To reduce arithmetic quantity necessary for the correction of a moving image.

SOLUTION: An encoding unit 100 for encoding a moving image is provided with a correcting part 121, a scene judging part 122, a correction data generating part 123, and a scene change detecting part 124. The scene change detecting part 124 detects the scene change of the moving image based on a different picture at the time of encoding, and inputs the detected result to a scene judging part 122. The scene judging part 122 judges the scene of the picture after the scene change by using a predicted picture from the movement compensating part 116 in detail, and a correction data generating part 123 decides a correcting method based on the result of the scene judgment. The correcting part 121 performs correction by the decided correcting method until the next scene change is detected. Thus, the correcting method is updated only when the scene change is generated so that the correction can be properly performed, and that the arithmetic quantity necessary for the correction can be reduced.



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* NOTICES *

1.This document has been translated by computer. So the translation may not reflect the original precisely.
2.**** shows the word which can not be translated.
3.In the drawings, any words are not translated.

CLAIMS

[Claim(s)]
[Claim 1] Time-varying-image-processing equipment characterized by having a means to acquire scene change information which it is time-varying-image-processing equipment, and shows a scene change in a dynamic image, and a means to determine an amendment method of said dynamic image until the following scene change information is acquired when said scene change information is acquired.
[Claim 2] Time-varying-image-processing equipment which is time-varying-image-processing equipment according to claim 1, and is characterized by having further a means which amends said dynamic image according to said amendment method until said following scene change information is acquired.
[Claim 3] Time-varying-image-processing equipment with which a means to be time-varying-image-processing equipment according to claim 1 or 2, to have further a means to memorize two or more typical amendment methods beforehand, and to determine said amendment method is characterized by choosing an amendment method of 1 from said two or more amendment methods based on an image after scene change information acquisition.
[Claim 4] Time-varying-image-processing equipment which is time-varying-image-processing equipment according to claim 1 to 3, and is characterized by a means to acquire said scene change information generating said scene change information based on a subtraction image of a prediction image of the present frame and an image of the present frame which are led from an image of a frame before the present frame.
[Claim 5] Time-varying-image-processing equipment with which it is time-varying-image-processing equipment according to claim 4, and a means to determine said amendment method is characterized by determining said amendment method based on said prediction image.
[Claim 6] Time-varying-image-processing equipment characterized by to have a means acquire scene change information which it is time-varying-image-processing equipment, and shows a scene change in a dynamic image, a means acquire an amendment method of said dynamic image until the following scene change information is acquired, and a means that amends said dynamic image according to said amendment method until said following scene change information is acquired.
[Claim 7] Time-varying-image-processing equipment which is time-varying-image-processing equipment according to claim 2 or 6, and is characterized by performing amendment of said dynamic image on real time.
[Claim 8] A time-varying-image-processing method characterized by to have a process which acquires scene change information which it is the time-varying-image-processing method, and shows a scene change in a dynamic image, a process which acquires an amendment method of said dynamic image until the following scene change information is acquired, and a process which amends said dynamic image according to said amendment method until said following scene change information is acquired.
[Claim 9] Are the record medium which recorded a program which performs amendment of a dynamic image on a computer and in which computer reading is possible, and activation by said computer of said program A process which acquires scene change information which shows a scene change in a dynamic image in said computer, A record medium characterized by performing a process which acquires an amendment method of said dynamic image until the following scene change information is acquired, and a process which amends said dynamic image according to said amendment method until said following scene change information is acquired.

[Translation done.]

DETAILED DESCRIPTION

[Detailed Description of the Invention]
[0001]
[The technical field to which invention belongs] This invention relates to the technology which amends various image properties, such as gradation, a hue, and saturation, to the dynamic image acquired as digital data.
[0002]
[Description of the Prior Art] Conventionally, the technology which amends the gradation of a dynamic image etc. on real time is proposed. For example, the time-varying-image-processing equipment which performs easy gradation amendment to JP,5-212620,A on real time is indicated. However, amendment of the dynamic image by the equipment indicated by the above-mentioned reference is restrictive, and suitable amendment according to the property of the image of each frame is not performed.
[0003] On the other hand, as amendment to a static image, JP,2000-57335,A is asked for characteristic quantity, such as gradation of an image, a hue, and saturation, and the technology of performing advanced amendment based on such characteristic quantity is indicated, for example.
[0004]
[Problem(s) to be Solved by the Invention] By the way, when the image of each frame of a dynamic image tends to be treated as a static image and it is going to apply the advanced amendment to a static image to amendment of a dynamic image, the amount of operations which amendment takes will increase. In order to process to a dynamic image on real time, it is necessary to set to 33 or less ms time amount which processing of one frame takes in the dynamic image of 30fps (30 per second). Therefore, it will be necessary to develop equipment expensive for applying the amendment method for a static image to real-time amendment of a dynamic image.
[0005] For this reason, conventionally, when performing advanced amendment to a dynamic image, once accumulating a dynamic image on record media, such as the so-called hard disk, processing has been performed on non real time. Since the amount of operations which amendment of the whole dynamic image takes becomes huge even if it is this case, much time amount is needed for processing.
[0006] This invention is made in view of the above-mentioned technical problem, the amount of operations which amendment of a dynamic image takes is reduced, and it aims at amending a dynamic image promptly.
[0007]
[Means for Solving the Problem] Invention according to claim 1 is time-varying-image-processing equipment, and is equipped with a means to acquire scene change information which shows a scene change in a dynamic image, and a means to determine an amendment method of said dynamic image until the following scene change information is acquired when said scene change information is acquired.
[0008] Invention according to claim 2 is time-varying-image-processing equipment according to claim 1, and it is further equipped with a means which amends said dynamic image according to said amendment method until said following scene change information is acquired.
[0009] Invention according to claim 3 is time-varying-image-processing equipment according to claim 1 or 2, it has further a means to memorize two or more typical amendment methods beforehand, and a means to determine said amendment method chooses an amendment method of 1 from said two or more amendment methods based on an image after scene change information acquisition.
[0010] Invention according to claim 4 is time-varying-image-processing equipment according to claim 1 to 3, and a means to acquire said scene change information generates said scene change information based on a subtraction image of a prediction image of the present frame and an image of the present frame which are led from an image of a frame before the present frame.

[0011] Invention according to claim 5 is time-varying-image-processing equipment according to claim 4, and a means to determine said amendment method determines said amendment method based on said prediction image.
[0012] Invention according to claim 6 is time-varying-image-processing equipment, and is equipped with a means to acquire scene change information which shows a scene change in a dynamic image, a means to acquire an amendment method of said dynamic image until the following scene change information is acquired, and a means that amends said dynamic image according to said amendment method until said following scene change information is acquired.
[0013] Invention according to claim 7 is time-varying-image-processing equipment according to claim 2 or 6, and amendment of said dynamic image is performed on real time.
[0014] Invention according to claim 8 is the time-varying-image-processing method, and has a process which acquires scene change information which shows a scene change in a dynamic image, a process which acquires an amendment method of said dynamic image until the following scene change information is acquired, and a process which amends said dynamic image according to said amendment method until said following scene change information is acquired.
[0015] Invention according to claim 9 is a record medium which recorded a program which performs amendment of a dynamic image on a computer and in which computer reading is possible. Activation by said computer of said program A process which acquires scene change information which shows a scene change in a dynamic image in said computer, A process which acquires an amendment method of said dynamic image until the following scene change information is acquired, and a process which amends said dynamic image according to said amendment method until said following scene change information is acquired are performed.
[0016]
[Embodiment of the Invention] <1. Gestalt > drawing 1 of the 1st operation is drawing showing the configuration of the image processing system 1 which performs acquisition of a dynamic image, amendment, and playback. An image processing system 1 has the regenerative apparatus 20 which performs playback of reception and a dynamic image for the dynamic image acquired with the video camera 10 which acquires a dynamic image as digital data, and the video camera 10 through the record media 91, such as a magnetic tape, and the display 30 which displays the dynamic image reproduced.
[0017] Drawing 2 is the block diagram showing the main configurations concerning processing of the dynamic image in an image processing system 1. An image processing system 1 has the coding unit 100 and the decryption unit 200, and the dynamic image acquired with the video camera 10 is inputted into the coding unit 100 as input image data 81. The input image data 81 is encoded in the coding unit 100 (namely, compression processing), and coded data 82 is outputted. At the time of playback, coded data 82 is inputted into the decryption unit 200, is decrypted (namely, extension processing), and is outputted as output image data 83.
[0018] Although the coding unit 100 and the decryption unit 200 may be formed in either a video camera 10 or the regenerative apparatus 20 so that it may mention later, the following explanation explains them as that in which a video camera 10 has the coding unit 100, and a regenerative apparatus 20 has the decryption unit 200.
[0019] Drawing 3 is the block diagram showing the configuration of the coding unit 100 which encodes amending a dynamic image on real time. Hereafter, each configuration of the coding unit 100 is explained.
[0020] The division section 101 divides into two or more partial images (henceforth "a block") the image of each frame of the dynamic image inputted as input image data 81. For example, the image of a raster scan is changed into the image of the block scan which makes a 8x8-pixel block an unit.
[0021] One by one, the block generated in the division section 101 is inputted into the amendment section 121, is amended, and is inputted into the subtraction section 102.
[0022] the subtraction section 102 asks for the subtraction image (the following -- "-- difference -- it is called block".) of the block after the amendment from the amendment section 121, and a block (henceforth "a prediction block") of the prediction image from the motion compensation section 116 mentioned later.
[0023] the difference outputted from the subtraction section 102 -- a block is inputted into the DCT section 103. the DCT section 103 -- difference -- DCT (discrete cosine transform) is performed to a block, and the signal of a time-axis field is changed into the DCT coefficient of a frequency domain.
[0024] The quantization section 104 quantizes the DCT coefficient from the DCT section 103, and the coding section 105 carries out variable length coding of the quantized DCT coefficient, and it carries out a sequential output as coded data 82.
[0025] Moreover, the DCT coefficient from the quantization section 104 is inputted also into the reverse quantization section 111, and the reverse quantization section 111 restores a DCT coefficient. the reverse DCT section 112 -- the difference from a DCT coefficient -- a block is generated.
[0026] the difference restored to the adder unit 113 -- a block and the prediction block from the motion compensation

section 116 are inputted, and an adder unit 113 adds these blocks. Thereby, the block (namely, decrypted data) of the image with which amendment by the amendment section 121 was reflected is generated. Then, the block of the generated image is memorized by the frame memory 114.
[0027] A frame memory 114 achieves the function as the delay section for one frame, and it carries out the sequential output of the block of the image of the before frame after amendment, carrying out the sequential storage of the block of the image of the present frame after amendment.
[0028] The block of the image of the present frame from the division section 101 and the block of the image after amendment of the before frame from a frame memory 114 are inputted into the motion vector detecting element 115. The motion vector detecting element 115 detects the motion vector 84 which shows a motion of a photographic subject from these blocks. Although the graphic display is omitted in drawing 2 , a motion vector 84 (data) is transmitted to the decryption unit 200 through a record medium 91 with coded data 82.
[0029] The motion compensation section 116 predicts the block of the image of the present frame using the block of the image after amendment of the motion vector 84 from the motion vector detecting element 115, and the before frame from a frame memory 114. Thereby, a prediction block is generated in the motion compensation section 116. And a prediction block is inputted into the subtraction section 102, an adder unit 113, and the scene judging section 122.
[0030] The configuration explained above is the same as the configuration in the usual dynamic-image compression almost. Next, the amendment section 121 which is a configuration concerning the dynamic-image amendment in the coding unit 100, the scene judging section 122, the amendment data generation section 123, and the scene change detecting element 124 are explained.
[0031] The amendment section 121 amends to the block inputted from the division section 101 according to the amendment method determined beforehand. Although the content of amendment may be what kind of thing, it explains with the gestalt of this operation as what performs amendment of contrast and lightness (namely, gradation of a pixel).
[0032] The scene judging section 122 generates the scene information which shows the feature of the photoed image based on the prediction image (prediction block group for one frame) of the present frame from the motion compensation section 116. Moreover, the amendment parameter which serves as criteria of amendment based on scene information is turned and outputted to the amendment data generation section 123.
[0033] The amendment data generation section 123 determines the amendment table showing the property of amendment according to an amendment parameter, and turns and outputs an amendment table to the amendment section 121. And in the amendment section 121, pixel value conversion of the block inputted while referring to the amendment table is performed.
[0034] the scene change detecting element 124 -- the difference from the subtraction section 102 -- a block is inputted and the scene change in a dynamic image is detected based on the subtraction image for one frame (namely, difference for one frame block group). And when a scene change is detected, the scene change information which shows a scene change is inputted into the scene judging section 122.
[0035] If scene change information is inputted into the scene judging section 122, like previous statement, the scene judging section 122 will perform the scene judging to a prediction image, an amendment parameter will be inputted into the amendment data generation section 123, and an amendment table will be inputted into the amendment section 121 from the amendment data generation section 123.
[0036] That is, in the coding unit 100, whenever a scene change is performed in a dynamic image, the amendment method is determined, and amendment of a dynamic image is performed by this amendment method till the next scene change. Consequently, compared with the case where a proper is amended to the image of each frame, the cutback of the amount of operations which amendment takes can be aimed at. In addition, about the details of processing concerning amendment, it mentions later.
[0037] difference with the contiguity frame which the coding unit 100 detected the motion vector for every block like the dynamic-image coding methods, such as MPEG, and carried out the motion compensation as explained above -- after searching for a block, variable length coding, such as Huffman coding, is performed. And in the coding unit 100, a scene change is detected based on the subtraction image for one frame, and the amendment method is determined.
[0038] Generally, suitable amendment is realized even if it amends using the amendment method that the contiguity frames in a dynamic image are the same while functionality is high unless a scene change is performed, and a scene change is not performed. So, in the coding unit 100, it has realized performing advanced amendment in the small amount of operations by analyzing the image of the frame after a scene change in details, drawing the suitable amendment method, and using this amendment method till the next scene change.
[0039] Drawing 4 is the block diagram showing the configuration of the decryption unit 200 which decrypts coded data 82 and generates the output image data 83. The decryption unit 200 has the same composition as usual decryption

equipment.
[0040] The decryption section 201 carries out the variable-length decryption of the coded data 82 inputted, and asks for the quantized DCT coefficient. The reverse quantization section 202 asks for the original DCT coefficient from the quantized DCT coefficient. and the reverse DCT section 203 -- the difference from a DCT coefficient -- a block is acquired.
[0041] an adder unit 204 -- difference -- a block and the prediction block of the present frame from the motion compensation section 207 are inputted, and the block of the image of the present frame is generated by adding these blocks.
[0042] The generated block is inputted into the sequential composition section 205, and is compounded, and the image of the block scan of a block unit is changed into the amended image of a raster scan. And the generated image [finishing / amendment] is outputted as output image data 83.
[0043] On the other hand, the block generated by the adder unit 204 is memorized by the frame memory 206, and it is used in order to generate a prediction block in the motion compensation section 207, in case the image of the following frame is generated. In addition, like previous statement, a motion vector 84 is inputted into the decryption unit 200 with coded data 82, and in case a motion compensation is performed in the motion compensation section 207, it is used.
[0044] Next, the details of actuation of the amendment section 121 in the coding unit 100, the scene judging section 122, the amendment data generation section 123, and the scene change detecting element 124 are explained. Drawing 5 is the flow chart showing the flow of processing concerning the amendment in the coding unit 100.
[0045] First, detection of the scene change in a dynamic image is performed by the scene change detecting element 124 (step S11). A scene change can be regarded as a large change of the image in a dynamic image, and total of the pixel value in the subtraction image for one frame is called for in the scene change detecting element 124. the difference by which a sequential input is specifically carried out -- it asks for total of a pixel value from a block, and total of the pixel value in the subtraction image for one frame is called for by carrying out sequential addition of the total.
[0046] Total of the pixel value in a subtraction image is an index value which shows the degree of the difference with the image of a before frame, and the image of the present frame, when total of the pixel value of a subtraction image exceeds a predetermined threshold, it is considered that it is that to which the scene change was performed, and scene change information is sent out to the scene judging section 122.
[0047] When a scene change is detected, the histogram (lightness histogram) of the pixel value of the prediction image (prediction block group for one frame) of the beginning after scene change detection is called for in the scene judging section 122 (step S12). In addition, although processing to a pixel value is performed to accuracy to the value (the gestalt of this operation gradation) drawn from a pixel value, the following explanation only explains it as processing to a pixel value.
[0048] Drawing 6 is drawing which illustrates the lightness histogram 7. The lightness histogram 7 is divided in two or more ranges, as signs 71-76 show, and a detailed scene judging is performed based on combination in two or more fields, such as total of the frequency of a pixel value, and a variance, (step S13).
[0049] A scene judging is processing which judges the condition of an image, and, specifically, the condition of an image is the processing which judges whether it is in the usual condition (Normal), the condition (high contrast) which is too strong, the condition (Rochon trust) that contrast is weak, the condition of a backlight, a too bright condition (excess), and a too dark condition (undershirt).
[0050] Completion of a scene judging acquires a parameter required for amendment according to the result of a scene judging in the scene judging section 122. Drawing 7 is the block diagram showing the delivery of various information to the scene judging section 122 and the amendment data generation section 123. In the scene judging section 122, the parameter table 852 is beforehand memorized by predetermined memory, and an amendment parameter required for amendment is acquired by testing by comparison the result of the scene judging to which it is led from the prediction image data 851 which is a prediction image, and a parameter table 852.
[0051] the response relation between the result of various scene judgings and a parameter required for amendment is shown so that a parameter table 852 may be illustrated with a table 1 -- a table -- **** -- it is. And the amendment level of contrast and the amendment level of brightness are inputted into the amendment data generation section 123 as an amendment parameter from the scene judging section 122 (step S14).
[0052]
[A table 1]

シーン情報	コントラスト補正レベル	明るさ補正レベル
ノーマル	5	5
ハイコントラスト	8	5
ローコントラスト	2	5
逆光	8	8
オーバー	5	3
アンダー	5	8

[0053] In addition, a parameter table 852 is beforehand set as an operator by the operator through the control unit 153 which receives the input of the display 152 and operator who display information. Drawing 8 is drawing showing the display screen at the time of setting up a parameter table 852. That is, for example, the screen illustrated to drawing 8 is displayed on the display 152 which is the display of the video camera 10 shown in drawing 1 , among drawing 8 , as sign 852a shows, highlighting of the parameter used as the object for setting out is carried out, and the content of the parameter table 852 is adjusted through the parameter setup section 151 by operating the control units 153, such as a manual operation button, according to the content of a display. It is supposed by this that a user is able to set up the favorite amendment method for every property of each scene, and the progression in quality of amendment of a dynamic image is planned.

[0054] In the amendment data generation section 123 which acquired the amendment parameter, as shown in drawing 7 , the amendment table which suits an amendment parameter is chosen from two or more typical amendment tables 853 beforehand memorized by memory 154 (step S15). In addition, the cutback of the amount of operations which the decision of an amendment table takes is achieved by preparing two or more amendment tables.

[0055] Drawing 9 is drawing which illustrates the property of an amendment table. It corresponds to the pixel value before a horizontal axis amending, and corresponds to the pixel value after an axis of ordinate amending. In drawing 9 , curvilinear 853a which is convex about shows the amendment table chosen (namely, when a judgment result is an "undershirt"), when making an image bright by amendment, and straight-line 853b shows the amendment table chosen (namely, when a judgment result is "Normal"), when not amending substantially. Curvilinear 853c which becomes about convex shows the amendment table chosen (namely, when a judgment result is "excess"), when making an image dark by amendment. Although the graphic display is omitted, when emphasizing contrast, a curve with the large maximum dip of a center section is chosen, and when weakening contrast, a curve with the loose dip of a center section is chosen.

[0056] The selected amendment table 854 is inputted into the amendment section 121, and pixel value conversion of the image inputted according to an amendment table is performed for every block in the amendment section 121 (step S16).

[0057] The amendment method until the next scene change is detected in the scene change detecting element 124 is determined in the amendment data generation section 123 by the above processing, and the amendment section 121 amends a dynamic image by the fixed amendment method according to the amendment table determined in the amendment data generation section 123 until the next scene change is detected. Consequently, suitable amendment can be performed without updating the amendment method for every image of a frame, and suitable dynamic-image amendment is realized in the small amount of operations.

[0058] Moreover, amending on real time on the occasion of coding of a dynamic image by the cutback of the amount of operations is also realized.

[0059] Moreover, in the coding unit 100 shown in drawing 3 , since the subtraction image in the case of coding is used for detection of a scene change, in order to detect a scene change, it is not necessary to prepare separately the configuration of the dedication which generates a subtraction image. That is, detection of a scene change is realized, without adding a new frame memory in the coding unit 100. Furthermore, since not an image but the prediction image set as the object of amendment on the occasion of a scene judging are used, it is supposed that the frame memory which memorizes separately the image set as the object of amendment is also unnecessary. Thereby, low-pricing of the coding unit 100 is realized.

[0060] In addition, in the above processing, after a scene change is detected, since the image (block) inputted into the amendment section 121 turns into an image of the 2nd frame, the new amendment method after a scene change is applied from the 2nd frame. Since a short-time indication of the image of each frame is given in case a dynamic image is displayed, even if it is the case where only the 1st suitable amendment is not performed, amendment suitable as the

whole dynamic image will be performed.
[0061] When suitable amendment needs to be performed from the 1st after a scene change, a frame memory is separately prepared in the upstream rather than the amendment section 121. And it asks, before amending the subtraction image of the image of a before frame, and the image of the present frame, and suitable amendment is realized from the 1st frame by detecting a scene change based on a subtraction image. Moreover, it also becomes possible to input not a prediction image but the image of the 1st frame after a scene change into the scene judging section 122 in this case, and to perform a scene judging.
[0062] <2. Although the coding unit 100 is made to amend a dynamic image with the gestalt of gestalt > implementation of the 1st of the 2nd operation, amendment of a dynamic image can be performed also in the decryption unit 200.
[0063] Drawing 10 and drawing 11 are the block diagrams showing the configuration of the coding unit 100 concerning the gestalt of the 2nd operation, and the decryption unit 200, respectively, in the coding unit 100, the amendment parameter in response to a scene change is generated, and amendment based on an amendment parameter is performed on real time with the decryption unit 200.
[0064] The coding unit 100 has the composition of having excluded the amendment section 121 and the amendment data generation section 123 from the coding unit in the gestalt of the 1st operation, and the amendment parameter 85 called for in the scene judging section 122 is passed to the decryption unit 200 through a record medium 91 with coded data 82 and a motion vector 84.
[0065] The decryption unit 200 forms the amendment section 211 between the adder units 204 of a decryption unit and the synthetic sections 205 in the gestalt of the 1st operation, and the amendment data generation section 213 is connected to the amendment section 211. And the processing as the corresponding configuration in the gestalt of the 1st operation that the amendment section 211 and the amendment data generation section 213 are the same is performed. That is, the amendment parameter 85 from the coding unit 100 is inputted into the amendment data generation section 213, and selection of an amendment table is performed in the amendment data generation section 213. The selected amendment table is inputted into the amendment section 211, and the amendment section 211 changes a pixel value, referring to an amendment table to the block generated by the decryption.
[0066] In addition, it is inputted according to a scene change, the amendment parameter 85 synchronizing with the input of coded data 82, and a change of the amendment method in the amendment section 211 is made according to the scene change of a dynamic image.
[0067] As mentioned above, it is also possible to judge amendment to a dynamic image and to amend in the decryption unit 200 with the coding unit 100. Even if it is this case, it is possible to change the amendment method according to the scene change in a dynamic image, and the cutback of the amount of operations which amendment of a dynamic image takes can be aimed at.
[0068] Moreover, amending on real time on the occasion of a decryption of a dynamic image by the cutback of the amount of operations is realized. Consequently, low-pricing and a miniaturization of equipment are also realized.
[0069] Moreover, with the gestalt of the 2nd operation, since the amendment parameter 85 is transmitted to the decryption unit 200 with coded data 82 and it amends at the time of a decryption, choosing whether it amends if needed in the case of a decryption is realized easily.
[0070] Furthermore, although the amendment method new from the image of the 2nd frame is applied with the gestalt of the 1st operation, applying the new amendment method after a scene change is easily realized from the 1st frame by performing the input of the amendment parameter 85 according to a scene change with the gestalt of the 2nd operation.
[0071] <3. The gestalt which performs gestalt [of the 3rd operation] >, next all processings concerning amendment in the decryption unit 200 is explained. Drawing 12 and drawing 13 are the block diagrams showing the configuration of the coding unit 100 in case a decryption unit performs all processings concerning amendment, and the decryption unit 200, respectively.
[0072] The coding unit 100 has the composition of having excluded further the scene judging section 122 and the scene change detecting element 124 from the coding unit in the gestalt of the 2nd operation, and performs only coding of a dynamic image.
[0073] The decryption unit 200 has the composition of having added further the scene judging section 212 and the scene change detecting element 214, to the decryption unit in the gestalt of the 2nd operation, and amends a dynamic image on real time with a decryption of coded data 82. That is, the scene change detecting element 214 detects a scene change based on the subtraction image (difference for one frame block group) outputted from the reverse DCT section 203, and a detection result is inputted into the scene judging section 212. In the scene judging section 212, a scene judging is performed based on the prediction image (prediction block group for one frame) from the motion compensation section 207, and it asks for an amendment parameter with reference to a parameter table based on a judgment result.

[0074] Then, the amendment table on which the amendment data generation section 213 was most suitable for amendment from two or more amendment tables using the amendment parameter is chosen, and amendment of the block by the amendment section 211 is performed using the selected amendment table. Thereby, the dynamic image after amendment is outputted as output image data 83 from the synthetic section 205.
[0075] As mentioned above, it is also possible to perform all the processings concerning the amendment to a dynamic image in the decryption unit 200. Even if it is this case, it is possible to change the amendment method according to the scene change in a dynamic image, and the cutback of the amount of operations which amendment of a dynamic image takes can be aimed at.
[0076] Moreover, amending on real time on the occasion of a decryption of a dynamic image by the cutback of the amount of operations is realized.
[0077] Moreover, in the decryption unit 200 shown in drawing 13 , by using the subtraction image in the case of a decryption for detection of a scene change, the addition of the new frame memory for amendment in the decryption unit 200 was excluded, and low-pricing of the decryption unit 200 is realized.
[0078] In addition, although the new amendment method after a scene change is applied from the 2nd frame also in the gestalt of the 3rd operation, in the whole dynamic image, it does not become a problem.
[0079] <4. gestalt [of the 4th operation] > -- the coding unit 100 and/or the decryption unit 200 which were explained with the gestalt of the 1st thru/or the 3rd operation can also be realized by software using a computer Drawing 14 is drawing showing the system which connects a video camera 10 and a computer 40 and performs amendment of a dynamic image by computer 40.
[0080] The computer 40 has composition of the general computer system which connected to the bus line RAM403 which memorizes CPU401 which performs various data processing, ROM402 which memorizes a basic program, and various information, as shown in drawing 15 . The communications department 408 which incorporates the signal from a video camera 10 is suitably connected through an interface (I/F) etc. at a bus line by making it the reader 407 which reads information in the record media 92, such as keyboard 406a and mouse 406b which receive the fixed disk 404 which performs further mass information storage, the display 405 which performs the display of an image, and the input from an operator, an optical disk, a magnetic disk, and a magneto-optic disk, and a list.
[0081] In case processing of a dynamic image is performed by computer 40, in advance, reading appearance of the program 441 for time varying image processing is carried out from a record medium 92 through a reader 407, and a fixed disk 404 memorizes. And while a program 441 is copied to RAM403, when CPU401 performs data processing according to the program 441 in RAM403, time varying image processing is realized. At this time, various information and a dynamic image are displayed on a display 405 if needed. In addition, keyboard 406a and mouse 406b are used for setting out of a parameter table.
[0082] When using as the coding unit 100 concerning the gestalt of the 1st operation of a computer 40, and a decryption unit 200, the picture signal from a video camera 10 is inputted as digital data through the communications department 408, and the coded data [finishing / the amendment to a fixed disk 404] 82 (and motion vector 84) is memorized by performing the processing as the various configurations shown in drawing 3 that the CPU401 grade in a computer 40 is the same. In case a dynamic image is reproduced, a dynamic image is displayed on a display 405 by performing the processing as the various configurations shown in drawing 4 that CPU401 grade is the same.
[0083] When coding processing cannot be performed on real time with the engine performance of CPU401 grade, the data of a dynamic image is stored in a fixed disk 404, and generation of coded data 82 is once performed after that.
[0084] Also when a computer 40 realizes the gestalt of the 2nd and the 3rd operation, it is made to function similarly as the coding unit 100 which shows a computer 40 to drawing 10 thru/or drawing 13 , and a decryption unit 200.
[0085] In addition, a computer 40 may realize actuation of either the coding unit 100 concerning the gestalt of the 1st thru/or the 3rd operation, or the decryption unit 200. For example, the equipment which performs only the usual coding processing as a video camera 10 in case a computer 40 realizes only the decryption unit 200 concerning the gestalt of the 3rd operation is used, and in case it decrypts by computer 40, amendment of a dynamic image is performed.
[0086] As mentioned above, even if the gestalt of the 1st thru/or the 3rd operation can also be realized using a computer and it is this case, the amount of operations can be reduced, and performing processing to a dynamic image promptly is realized.
[0087] <5. Although the gestalt of operation of this invention has been explained more than modification >, this invention is not limited to the gestalt of the above-mentioned implementation, and various deformation is possible for it.

[0088] For example, although processing which relates to amendment of a dynamic image in the coding unit 100 and/or the decryption unit 200 is performed with the gestalt of the above-mentioned implementation, detection of a scene

change may be performed regardless of processing of coding of a dynamic image, and a decryption, and amendment of a dynamic image may be performed.

[0089] Moreover, although a subtraction image is acquired from the subtraction section 102 of the coding unit 100, or the reverse DCT section 203 of the decryption unit 200 and he is trying to detect a scene change with the gestalt of the above-mentioned implementation, detection of a scene change may be performed by other technique. For example, detection of a scene change may only be performed from the subtraction image of the image of a before frame, and the image of the present frame. Moreover, a scene change may be detected from the histogram and motion vector of a pixel value of a subtraction image.

[0090] Moreover, the information which shows the timing of a scene change may be prepared apart from a dynamic image. That is, a scene change does not need to be detected from a dynamic image and the information which shows a scene change may be acquired by being inputted separately.

[0091] Furthermore, although it has detected as a scene change that a dynamic image changes a lot with the gestalt of the above-mentioned implementation, the scene change detected in this case is not necessarily in agreement with the physical scene change in the case of photography. Even if it is one scene, when a dynamic image changes a lot, it is detected as a scene change. Thus, the scene change in the above-mentioned explanation does not need to be in agreement with modification of a physical scene, and suitable amendment of a dynamic image and the cutback of the amount of operations are realized by detecting change of the dynamic image equivalent to a scene change as a scene change.

[0092] Moreover, with the gestalt of the above-mentioned implementation, although amended to the image of each frame, amendment may be performed to a subtraction image. In this case, the amendment table for subtraction images is used. And in amending to a subtraction image, it also becomes possible to perform amendment of a dynamic image after the subtraction section 102 of the coding unit 100 and the reverse DCT section 203 of the decryption unit 200. Thus, it is possible to perform amendment of a dynamic image based on a scene change in the phase of arbitration.

[0093] Moreover, although the gestalt of the above-mentioned implementation explained that coded data 82 was inputted into a regenerative apparatus 20 from a video camera 10 through a magnetic tape, what kind of technique may be used as the data transfer technique. For example, an IC memory and the disk for record may be used as a record medium for a transfer, and radio or the wire communication through a transmission medium or a computer network may be used. In addition, various technique may be similarly used about the data transfer between the video cameras 10 and computers 40 in the gestalt of the 4th operation.

[0094] Moreover, although the gestalt of the above 1st thru/or the 3rd implementation explained as that by which the coding unit 100 is formed in a video camera 10, and the decryption unit 200 is formed in a regenerative apparatus 20, these both sides may be established in a video camera 10, or may be established in a regenerative apparatus 20. That is, it does not pass over the video camera 10 or regenerative apparatus 20 in the above-mentioned explanation in an example, but the various configurations of the coding unit 100 or the decryption unit 200 may be prepared in what kind of mode.

[0095] Moreover, although the gestalt of the above-mentioned implementation explained that the data concerning an image was inputted into a regenerative apparatus 20 or a computer 40 from a video camera 10, it replaces with a video camera 10 and other image output units, such as a videocassette recorder, may be used.

[0096] Moreover, with the gestalt of the above-mentioned implementation, by performing a motion compensation, the prediction block of the present frame is searched for, it prevents that migration of the main photographic subject in the same scene is detected as a scene change, the detection frequency of a scene change is reduced, and the cutback of the amount of operations is in drawing. However, configurations which relate to a motion compensation except a use with few motions, such as a fixed point observation (for example, monitor by the surveillance camera), may be omitted. In this case, a prediction image is carried out and the image of a before frame is used. In addition, a prediction image is limited to neither the image after a motion compensation, nor the image of a before frame, and is led from the image before a before frame, and as long as it is the image which can be used as a prediction image of the present frame, what kind of thing may be used.

[0097] Moreover, the amendment in the gestalt of the above-mentioned implementation may not be limited to amendment of brightness gradation, and may be amendment of other image characteristic quantity, such as saturation, a hue, and a color saturation ratio, or two or more image characteristic quantity.

[0098] Moreover, with the gestalt of the above-mentioned implementation, although the image of each frame is divided into the block in the division section 101, processing of amendment, coding, a decryption, etc. may be performed, without dividing an image into a block. On the contrary, although it is made the business which performs the same amendment to the whole block of one frame with the gestalt of the above-mentioned implementation, amendment using

a different amendment table for every block may be performed. In this case, the amendment table corresponding to each block is used in the amendment section, and if a scene change is detected, renewal of these amendment tables will be performed.

[0099] Moreover, with the gestalt of the above-mentioned implementation, according to the existence of the detection in a scene change detecting element, the existence of the processing in the amendment data generation section etc. is determined, and change arises in the processing time. Therefore, in order to process more nearly promptly, the rate of the amount of data inputted into the amendment section may be changed according to the existence of detection of a scene change. For example, when raising and a scene change are detected in a data transfer rate while making the detection result of a scene change input into the division section 101 from the scene change detecting element 124 and not detecting a scene change as a dashed line shows drawing 3 , you may make it lower a data transfer rate.

[0100] Moreover, although the gestalt of the above-mentioned implementation explained that two or more typical amendment tables were beforehand prepared as two or more amendment methods, an amendment table may be generated whenever a scene change is detected. For example, an amendment table may be generated from the accumulation histogram of the pixel value in a prediction image or the decrypted image. That is, normalization of a frequency value, clipping of the value more than fixed, addition of constant value, amendment of black and a white edge, etc. are performed to an accumulation histogram, and an amendment table may be generated.

[0101] Moreover, although the gestalt of implementation of the above 4th explained that the coding unit 100 and/or the decryption unit 200 were realized by using a computer 40, some coding units 100 and/or some decryption units 200 may be realized by the computer. The 1st thru/or the various configurations in the gestalt of the 3rd operation do not need to be clearly divided in hardware, either, and may be realized, using a logical circuit and a microcomputer suitably. For example, a microcomputer may realize processing in the amendment data generation section, and a logical circuit may realize other configurations. Furthermore, the coding unit 100 and/or the decryption unit 200 may be built by two or more computers.

[0102] Moreover, the configuration which relates to amendment as shown in the gestalt of the above 1st thru/or the 3rd implementation can be divided into arbitration, and can be prepared in the coding unit 100 or the decryption unit 200. For example, it is also possible to form only the scene judging section 122 in the coding unit 100, and to prepare the configuration of others concerning amendment in the decryption unit 200.

[0103]

[Effect of the Invention] In claim 1 thru/or invention of 9, the cutback of the amount of operations which amendment of a dynamic image takes can be aimed at.

[0104] Moreover, in invention of claim 3, the amount of operations which the decision of the amendment method takes is reduced.

[0105] Moreover, in invention of claim 4, scene change information can be acquired appropriately and it also becomes possible to use further the subtraction image acquired in the case of coding of a dynamic image or a decryption.

[0106] Moreover, in invention of claim 5, in order to determine the amendment method using the prediction image at the time of asking for not an image but the subtraction image set as the object of amendment, a means to memorize separately the image set as the object of amendment becomes unnecessary.

[0107] Moreover, in invention of claim 6, amending a dynamic image on real time is realized easily.

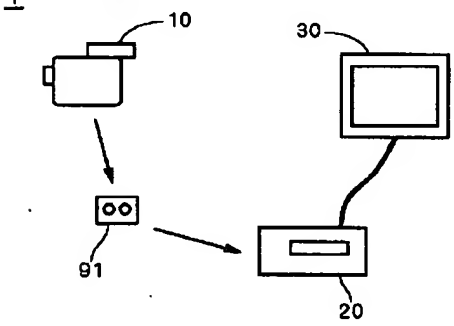
[Translation done.]

* NOTICES *

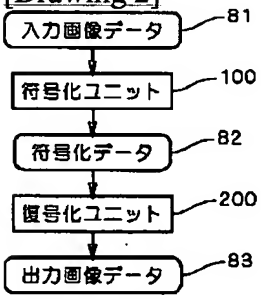
1.This document has been translated by computer. So the translation may not reflect the original precisely.
2.**** shows the word which can not be translated.
3.In the drawings, any words are not translated.

DRAWINGS

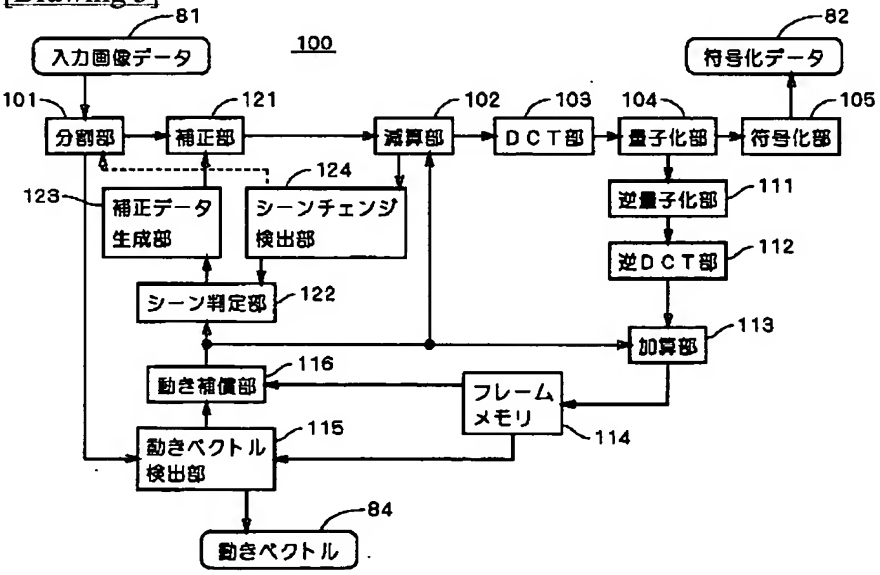
[Drawing 1]



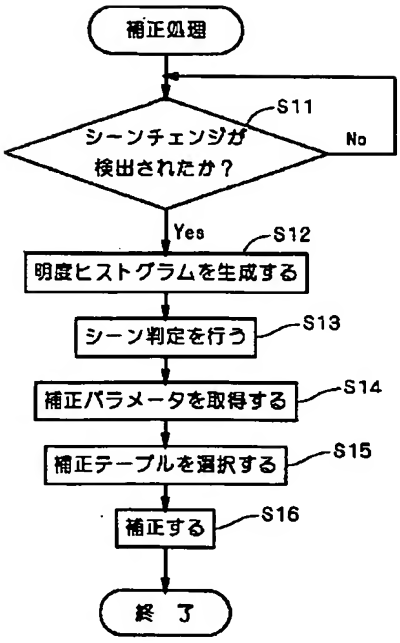
[Drawing 2]



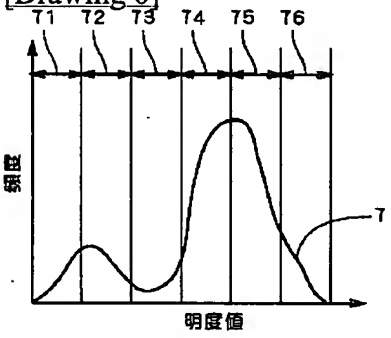
[Drawing 3]



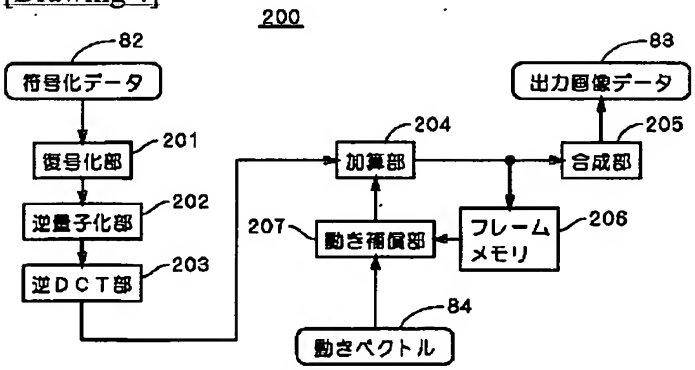
[Drawing 5]



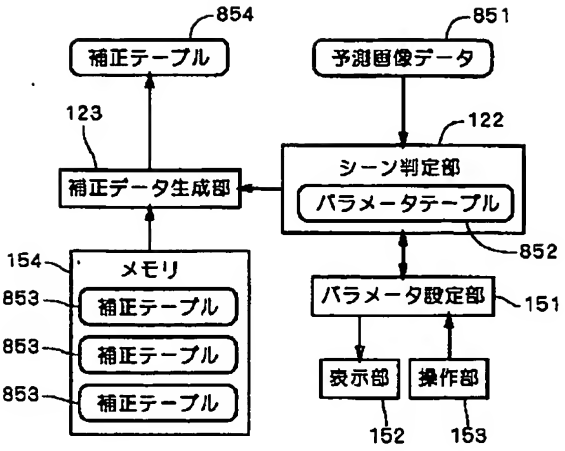
[Drawing 6]



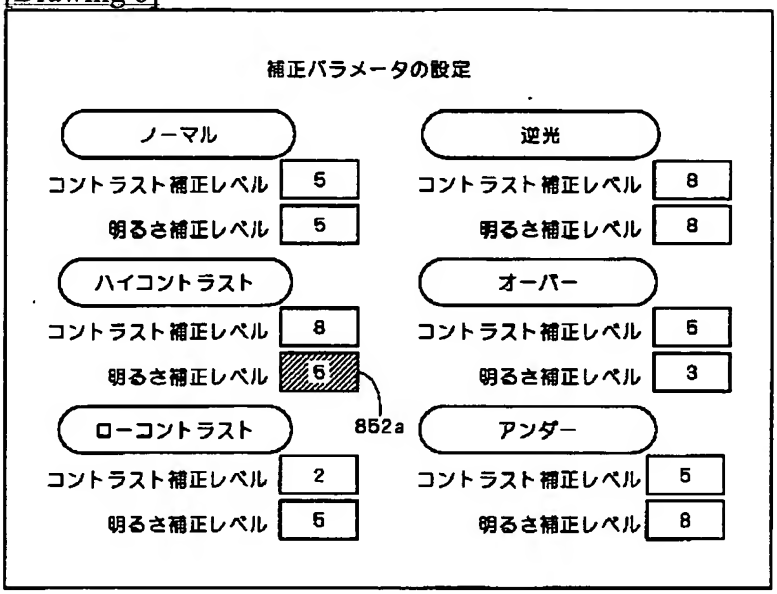
[Drawing 4]



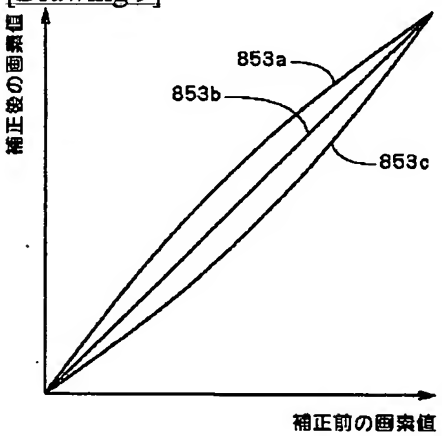
[Drawing 7]



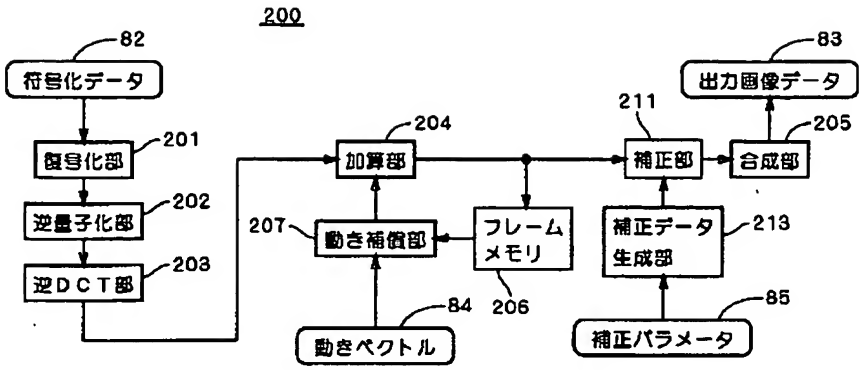
[Drawing 8]



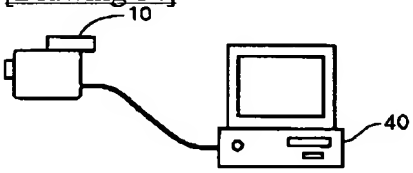
[Drawing 9]



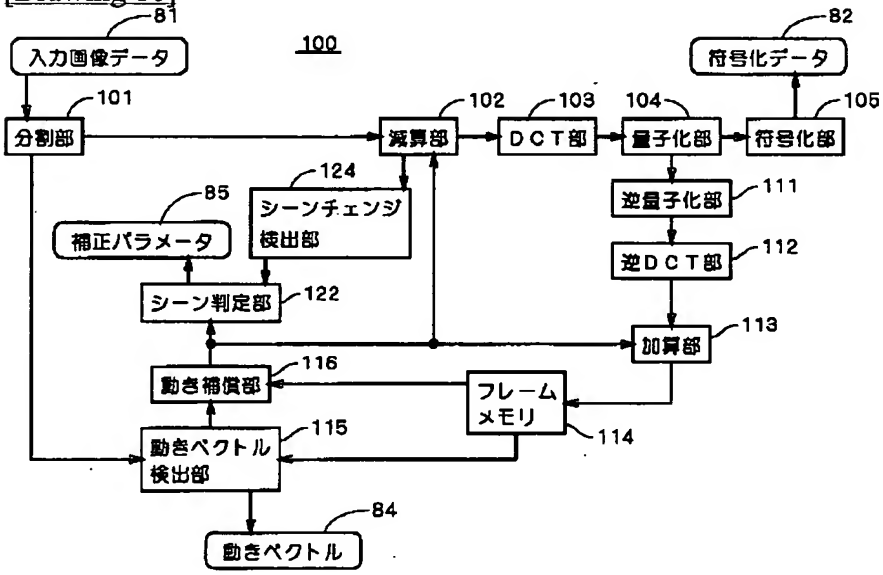
[Drawing 11]



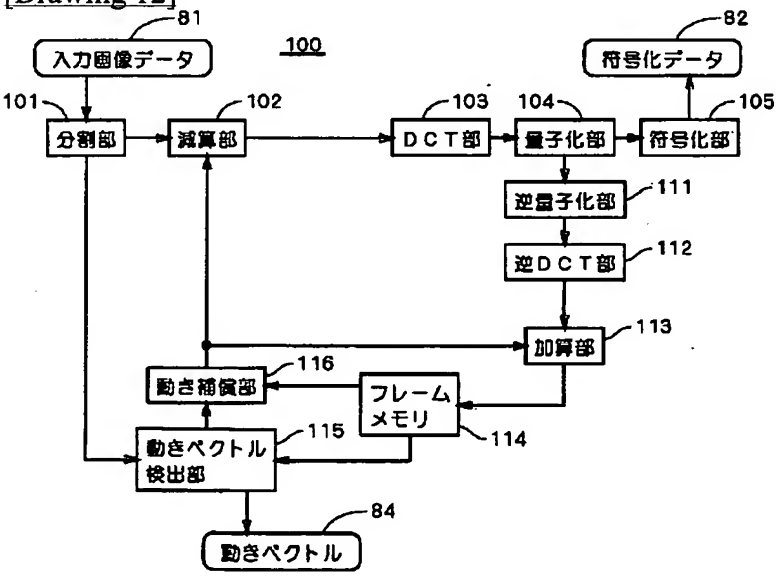
[Drawing 14]



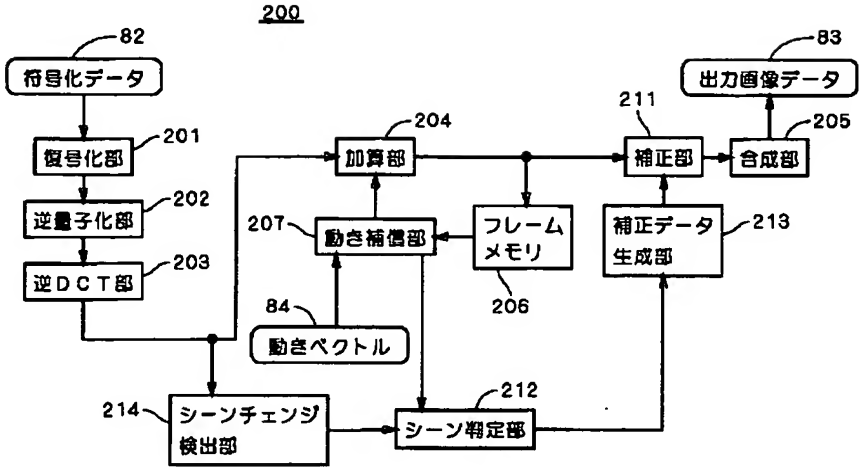
[Drawing 10]



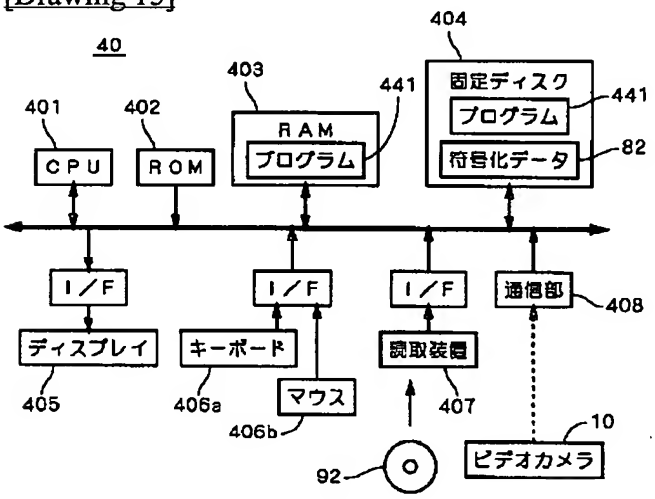
[Drawing 12]



[Drawing 13]



[Drawing 15]



[Translation done.]